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Article

Learning when time is an option

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BANKING & FINANCE | RESEARCH ARTICLE

Learning when time is an option

Randy Beavers^{1*} and Richard Dadzie²

Abstract: Generally, students would like more time in class to understand nuances of material for a variety of reasons. However, current scheduling limits terms to durations ranging from three to 16 weeks. This paper discusses an experimental system allowing learning outcomes to occur beyond normal scheduling constraints by allowing students to finish the course beyond the official allotted time and measuring the results. Data were collected from the instructor's website that posted grades with anonymous names provided by students. Univariate t-testing was used to determine any statistically significant benefits as measured by grades from the time extension. Students who had already passed the course retook exams to raise their grades, but most students who failed during the normal time constraint still failed, even with the extended time option. Passing rates decreased and overall learning outcomes measured by test scores and a homework assignment also decreased. Delivery formats were also analyzed, which vary from online only, to hybrid where the class meets once a week, to traditional where the class meets twice a week with a weekly lab. According to final grades earned, the hybrid and traditional classes performed better than online. These findings suggest that some human interaction beyond the digital classroom is necessary in order to observe improved student outcomes. A pedagogical experiment considering extended time in higher education for this length of time is not documented in the literature.

Subjects: Finance; Corporate Finance; Educational Research

Keywords: pedagogy; traditional; online; hybrid; cognitive load; introductory finance

ABOUT THE AUTHOR



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Randy Beavers joined the School of Business, Government, and Economics after receiving his Ph.D. in Finance from the University of Alabama. While at the University of Alabama, Randy taught Business Finance and Financial Management. Randy's research interests focus on executive compensation, corporate finance, and financial education.

PUBLIC INTEREST STATEMENT

We document a flexible, experimental system that allowed students to finish a course beyond the official allotted time. Students who had already passed the course retook exams to raise their grades, but most students who failed during the normal time constraint still failed, even with the extended time option. Passing rates decreased and overall learning outcomes measured by test scores and a homework assignment also decreased. According to final grades earned, the hybrid and traditional classes performed better than online. These findings suggest that some human interaction beyond the digital classroom is necessary in order to observe improved student outcomes. In light of recent events with COVID-19, this may not be possible for some time. Thus, online courses must attempt to engage students as much as possible in order to prevent dissatisfaction among students and to prevent retention and success rates from declining.

1. Introduction

Generally, both educators and students would like more time beyond the semester or quarter to further guide the students' learning. In other words, can student learning be enhanced if more time is given as previous research positively correlates study time and performance (Nonis & Hudson, 2010)? To address this, one could challenge the status quo and allow students to continue to work beyond the time constraints of the semester, similar to a real option on a project to extend it. This occurred in business finance classes held at a university for two years. Using data available pre-, during, and post-experiment for the extension option, this paper tests if the extension option was significantly successful in improving learning assessments of exams and final numbers in student passing rates. We use a unique dataset from 2009 to 2015, when the extension option occurred during 2011 and 2012, to explore the learning outcomes achieved via test scores, attendance policies, bonus assignments, and a semester-long homework assignment. We use univariate t-testing to see if there are differences across the means of each assignment across periods.

We also consider class formats. Business finance class formats typically follow the standard traditional classroom experience where students meet periodically throughout the week. However, this format has evolved in recent years due to increasing numbers of students attending college in the early 2000s. This prompts the question: is a different approach helpful in increasing student achievement in introductory finance? Two other formats have emerged, which include classes conducted completely online, and a once-a-week hybrid class that is like a shorter version of a class or a short lab time, where students work problems and ask questions to a teaching assistant. We considered how these various class formats could have contributed to significantly affecting student pass rates and overall learning outcomes.

The remainder of the paper is organized as follows. The next section discusses the literature followed by the experimental methodological approach. Results of the experiment are statistically analyzed followed by a discussion and conclusion of policy implications and future research considerations.

2. Literature review

The original idea behind this experiment was to give students more time and space to learn material in a business finance class that is required of all business majors. Thus, a student could start the class in each semester and finish it later with no final penalty on their transcript. In theory, a student could start the course and wait until just before graduation to finish, or finish the class one semester before completing the degree, submit a grade change, and receive the full benefits of completing the work, receiving a higher grade and GPA to submit to future employers or graduate schools.

Hypothesis 1: The extension option should increase overall exam performance, GPA, passing rates, etc.

Research has demonstrated giving more time to think enhances learning outcomes (Tobin, 1987). Slowing down the learning process is especially helpful for special needs students (Rowe, 1986), and given the growing number of students on college campuses across the United States requiring disability accommodations (Wolf, 2001), this could be viewed as a solution to a growing concern. Other reasons to provide this alternative include giving time and space to underrepresented groups new to college, including non-Whites, non-Asians, and first-generation students, who make up almost one-third of the undergraduate population (NCES 2017).

Educational research analyzing class formats and learning outcomes include Sims and Schuman (1999) demonstrating pretest scores were higher for online students, but there was no statistical difference between online and in-class students. Students who are timely and consistent in accessing materials in a blended class perform better (Asarta and Schmidt, 2013). After controlling for technology, there is no difference in exam performance between online and in-class students

(Smeaton & Keogh, 1999). However, the literature does not agree on performance. One study found online students performed better in a statistics course (McCollum, 1997). However, relational skills and hard skills, like negotiation and problem solving, respectively, are better in face-to-face environments than online ones (Callister & Love, 2016).

Overall, students can benefit from more learning time when tasks are difficult, especially finance, due to cognitive load theory, which suggests people have limited resources from which to exert mental effort (Chew, 2007; Clark et al., 2006). Students can benefit from devoting a current limited resource in brainpower and time to other courses and potentially use more free time in a later semester to focus on finance, given the student choices in their learning and allocation of time to spend studying something else. This setup helps students become self-regulated (Zimmerman & Schunk, 2001). This is especially true of college students who procrastinate and underestimate how much time it takes to complete a task. A typical student will not take advantage of long deadlines and will only spend half the extra time given on a project (Ackerman & Gross, 2005). We will consider this outcome in the Results section later.

With respect to finance, several articles have attempted to address issues in the undergraduate principles of finance course. Students perform equally as well on quizzes when taught according to lecture or with case studies (Moore, 1999). However, some students prefer just lectures, while others prefer lectures with breaks for active learning tasks (McCullough & Munro, 2018). Most finance faculty use computers for in-class instructions and assignments, and about half use group work and writing assignments. Student presentations are not common in the introductory finance class (Saunders, 2002). Multiple-choice exams reduce the statistical significance of gender and major (besides accounting) in test performance, thus suggesting multiple-choice exams level the playing field (Terry, 2002). Using pre-tests and post-tests enhance knowledge gained in a basic finance course (Heinfeldt & Wolf, 2002). Introductory finance classes with team learning may benefit from high success rates, lower drop rates, improved attendance, increase student involvement, increased student class preparation, and more efficient class time usage (Ingram & Adams, 2003). Course management software and discussion boards help students perform better, especially females and older students (Wilson, 2003). The cumulative/rework testing strategy hurts student performance in principles of finance courses (Chan & Shum, 2004). Spreadsheet assignments lead to higher performance in introductory finance courses (Cagle et al., 2010). Tablet PC technology enhances retention rates and performance (Phillips & Loch, 2012). Others document enhancements to performance, including sleep (Burrus & Graham, 2013) and unsuccessfully attempting the class at least once before (Biktimirov & Armstrong, 2015).

3. Methodology

The dataset is unique in that it updates periodically as students' progress throughout the semester. Students uniquely identify themselves with a screen name of their choice, and they were able to access their grades online via the publicly available class website. Updates occurred after a major assessment was supposed to occur, such as after an exam or after a portion of homework was graded. The data are for all business finance students at the university from 2009 to 2015. All students and teaching assistants used the following class format. Teaching assistants had limited control in how they ran review sessions and were randomly assigned each semester. Summer teaching assistants chose whether to teach sections.

The course is business finance, a course available for students admitted to the upper division of the business school at a public university. Course prerequisites included microeconomics, macroeconomics, statistics, financial accounting, and business calculus. The material for the course comes from Thomas Downs's (the instructor of record for all courses) textbook *Lessons about the Structure of Finance*. Online resources were also provided including video lectures of class and demonstrations of financial problem-solving procedures, which has been shown to increase knowledge (Hong et al., 2018). Despite the growing presence of online teamwork through learning management systems (Hwang, 2018), this was utilized throughout all classes via discussion boards available for current and curated explanations and issues with specific homework and test

problems. Exam one reviews principles from financial accounting and relationships among the financial statements (chapters one through three). Exam two covers the time value of money and valuation (chapters four through six). The material on exam three examines risk and return (chapters 7, eight, and 10). The final exam is not necessarily cumulative in nature but covered new topics of transformation value, arbitrage, and derivatives (Chapters 11, 12).

The course assessments (described below) included exams, a three-part homework assignment called the “Trading Game”, online quizzes, a wildcard (the top exam grade counted for 10% more), and various small extra credit or deductions for incentives. The homework assignment counted 10%, the quizzes counted 15%, and the remaining percentage of 65% involved exams.

Exams for the class consist of 25 multiple-choice questions with weights according to difficulty, ranging from easier questions containing conceptual questions to harder questions requiring rigorous knowledge to compute answers to questions concerning financial formulas. Students have a formula sheet and may use a financial calculator. They also may take the exam multiple times, beginning the second week of the semester through finals week. Students could retake any exam up to three times. The highest grade counted. Students received a separate timeliness bonus if they had attempted the first three exams by a certain date, respectively. They may take each exam in class for a free shot (given in three-to-four-week intervals over the course of the regular semester), and the remaining three attempts are available online. Students are required to hire a proctor or go to a testing lab in order to take the online tests.

The students also take quizzes online throughout the semester. Their quiz score is calculated from the top 15 results of 27 quizzes. Each quiz contains three multiple-choice questions, weighted according to difficulty (except the first quiz, which has seven conceptual questions). Students may take the quiz up to three times, with the average score counting as their grade. Students can take quizzes beginning the first day of class (since no proctoring is required for these assessments due to the number of them) until the last day of finals.

Some semesters allowed a couple of bonus options. First, there was a buyback option to rework questions on the exam to receive a percentage of points back in order to raise their grade. The second option allowed students to receive a percentage of points back from reworking correct answers to online practice problems affiliated with the exam material.

Attendance policies for students in the full-time class and hybrid provided bonus opportunities as well. Students who attended all the classes (including the main lecture session and the remedial lab session) received three points added on to the individual’s final course score. The remedial lab session times were 50 minutes long and took place in standard physical classrooms. They occurred on Mondays from 9 am to 8 pm. For every class missed, 0.75 points was deducted. For students in the hybrid only sections, they would receive 1.5 points for attending every lab.

Finally, a semester-long homework assignment broken into three parts allowed students to invest in various assets, such as stocks, bonds, mutual funds, treasuries, options, and currencies. Students created a portfolio in Excel and tracked changes to their 100,000 USD fake portfolio. The assignment included opportunities to not only invest but also analyze their own financial perspectives through various online surveys and graphing the security market line as well as the risk-return profile of their bonds using a Bloomberg terminal or Morningstar. All students in all sections were required to complete this assignment.

With respect to the assessments, students were required to complete the various bonus aspects, such as exam timeliness bonuses, during the semester in which they first enrolled in the course. In addition, the major class assignment is due during the semester. Students had the option to delay taking their online quizzes and other three online attempts at exams during a later semester. The Results section discusses these components with more specific statistical testing.

4. Results

Data were collected in Excel from the instructor’s public website from 2009 to 2015. They were then coded appropriately for use in Stata. This information is available upon request. The Appendix provides data definitions. Table 1 provides summary statistics for the entire dataset in order to demonstrate trends and understand what the expectations should be. The data include 103,861 observations of updated student data from 2009–2015. The overall sample size is 10,384 students. Results of note include the four examination scores means falling after each subsequent exam (Exam 1 has a mean of 56, and Exam 4 has a mean of 28). In terms of exam average performance, there are several plausible reasons for variation in the scores and observations. First, many students take exam one because they are still enrolled in the course. Some students eventually dropped and/or never completed the course before the exercisable option to complete expired. Second, exam two may have the highest average because one could learn how to use a financial calculator (permissible on all exams) to do much of the work. Last, some students never take exam four because they never reach this point in the course material, or they do not need to complete this exam in order to pass the course. This exam, despite having new material with only two chapters, is rated by the professor and teaching assistants as the easiest, and has a lower average because students tend to compute what they need to pass the course with their desired grade and aim for this target. Note, almost 20% of the observations include data where a student attempted and received at least some points in taking Exam 4. Almost 60% of the observations show the student passed the class with a 64.5 or better. Of those who passed, about 97% attempted Exam 4. Students achieving a perfect score on the 25 multiple-choice exams receive a score of 100.1. The additional 0.1 noted the student earned a perfect score. Due to scaling formulas and grading curves, students could in theory make a 100 without answering all the questions correctly.

Table 2 provides univariate t-testing of the means of scores for when the class technically ends according to the academic calendar versus the final score including the dates when the time extension option was available beginning January 2010 and when it expired in late October 2012. This allows us to see if the treatment was beneficial, harmful, or had no effect. Initial results indicate scores were statistically higher at the 1% level, including the quizzes, all exams, the trading game homework assignment, and the average quiz score. Items that were statistically significant but lower on average included attending lab and lecture and the exam timeliness

Table 1. Summary Statistics for the Whole Dataset

Variable	Obs	Mean	Std. Dev.	Min	Max
Equiz Submit	97,978	8.084	8.057	0	27
Quiz Avg	102,305	38.217	39.671	0	100
Exam 1	97,012	55.769	35.437	0	100.1
Exam 2	80,481	52.148	39.642	0	101
Exam 3	62,576	43.733	37.388	0	106
Exam 4	52,540	28.338	37.605	0	100.1
Trading Game	42,105	60.665	42.034	0	106
Course Avg	87,873	34.206	30.170	-15	110
Lab Bonus	25,253	0.479	1.182	-3	3
Lecture Bonus	23,048	0.009	0.619	-1.5	1.5
ClassAt Bonus	8,196	1.271	1.758	-3	3
Year	103,861	2012.609	1.889	2009	2015
Avg Equiz	16,636	73.463	31.125	0	107.9
Exam Timely	34,014	4.994	863.324	-1.5	159,222
Avg WQA & E	5,616	62.483	27.991	0	100
Ap Course Sco	2,950	69.650	20.641	0	103

Table 2. Means of Class Ending Scores vs. Class Final Scores

Variable	Final	Ending	T-test
Equiz Submit	15.987	12.517	26.316***
Quiz Avg	74.914	58.422	27.430***
Exam 1	68.163	57.992	20.517***
Exam 2	67.578	50.487	30.183***
Exam 3	58.852	40.549	33.014***
Exam 4	57.696	34.223	39.601***
Trading Game	67.918	61.867	9.025***
Course Avg	65.391	49.472	29.803***
Lab Bonus	0.497	0.544	-1.734**
Lecture Bonus	0.008	0.061	-3.443***
ClassAt Bonus	1.510	1.512	-0.035
Year	2012.301	2011.357	33.082***
Avg Equiz	85.053	76.234	7.753***
Exam Timely	0.319	0.356	-1.644*
Ap Course Sco	75.108	62.308	6.359***

In this table and all tables following, ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

bonus, which gave students who made the deadline to take their first attempt at an exam, either online or in class, extra credit. This helped to reduce long lines in the test proctoring labs. Overall, the time extension increased grades and items that could be redone (exams and quizzes).

The behavior of the students during this period of the experiment was analyzed. After removing duplicate observations where the data is updated (18,506), positive exam changes in at least one of the exams occurred 17.4% of the time. Most of these changes occurred with exam one (11%), followed by four (7%), two (5.6%) and three (5.5%). The average student who used the option did so 1.5 times with a maximum of 11 (based on semester data updates). Based on using the option with an exam average of 67.5%, 74.6% of the observations should have used the option. 11% of the observations used the option but still failed the class. 6.4% did so to raise the grade to at least passing. Looking at the final grade at the individual level (4,948) and assuming a passing exam average of 67.5%, 64% of individuals should have used the option but only 21.5% did. Of those, 10.7% raised their grades successfully while 11% did so but still failed to pass the class. Lastly, the time that students chose to exercise the options were analyzed since the options followed the American anytime format. On average, some did so relatively early in the update history (22.0%) relative to the final expiration date. The percentage of the individual observations who waited to use the option until expiration was 21.6%. We conclude two important items: first, students tended to focus more time on assessments that were initially poor, and second, students tended to procrastinate, especially those who took the course in the early (2010) portion of the experiment.

Table 3 tests the differences in means of the final scores between the no extension semesters and the semesters with the time extension option. With the option present, the scores are lower across the board, including exams, quizzes, and homework. The only statistically positive results come from more students achieving the lecture attendance bonus and receiving a slightly higher average on the quizzes (at the 5% level). Students' final scores, on average, were not as high. This suggests mainly students who had already passed the class but wanted to achieve a higher grade and submitted a grade change to improve their GPAs and transcripts for future employers and graduate school applications utilized the option.

Table 4 demonstrates the time extension option as a treatment by analyzing the means of the data pre- and post- option. Fortunately, there was a year of data available before the extension

Table 3. Means of No Extension vs. Extension Final Scores

Variable	No Extension	Extension	T-test
Equiz Submit	16.156	15.676	2.979***
Quiz Avg	76.407	71.670	6.405***
Exam 1	69.652	64.957	8.057***
Exam 2	70.352	61.608	12.935***
Exam 3	61.947	52.189	14.543***
Exam 4	63.145	45.967	23.737***
Trading Game	70.356	63.139	8.550***
Course Avg	67.871	60.195	11.409***
Lab Bonus	0.480	0.517	-1.252
Lecture Bonus	-0.032	0.065	-5.813***
ClassAt Bonus	1.562	1.405	1.484*
Year	2012.894	2011.023	51.809***
Avg Equiz	83.333	85.833	-2.1143**
Exam Timely	0.348	0.307	1.090

Table 4. Extension Option as a Treatment

Variable	Pre- No Extension	Extension	Post-No Extension	Test Pre & Treatment	Test Post & Treatment	Test Pre & Post
Equiz Submit	16.802	15.676	16.131	2.179***	-2.797***	1.328*
Quiz Avg	80.429	71.670	75.530	7.813***	-4.898***	4.638***
Exam 1	74.208	64.957	68.659	9.826***	-5.964***	6.950***
Exam 2	76.139	61.608	69.091	13.633***	-10.402***	7.472***
Exam 3	69.266	52.189	60.351	16.100***	-11.539***	9.456***
Exam 4	69.779	45.967	61.698	20.862***	-20.611***	7.910***
Trading Game	61.620	63.139	71.309	-0.890	-9.456***	-5.956***
Course Avg	N/A	60.195	67.871	N/A	-11.409***	N/A
Lab Bonus	N/A	0.517	0.480	N/A	1.252	N/A
Lecture Bonus	N/A	0.065	-0.032	N/A	5.813***	N/A
ClassAt Bonus	N/A	1.405	1.562	N/A	-1.484*	N/A
Year	2009	2011.023	2013.744	-93.253***	-1400 ***	-1800***
Avg Equiz	83.333	85.833	N/A	-2.114**	N/A	N/A
Exam Timely	N/A	0.307	0.348	N/A	-1.090	N/A
Avg WQA & E	78.640	64.420	N/A	4.660***	N/A	N/A

option, and much data after the time extension option expired. The findings indicate similar results to Table 3. Interestingly, grades declined in comparing the pre- and post-treatment periods, except for the trading game homework assignment. This demonstrates the trend on college campuses of lower grades when compared to previous standards held over time, despite grade inflation being prevalent in colleges across the United States (Rojstaczer, 2016). Note, the assessment material and questions did not change during the sample period. Conceptual questions remained the same and problem questions were generated with an algorithm, so the numbers changed but the formulas and methodology required to get the correct solution were not modified.

Table 5 provides statistical tests of differences in means across semesters. On average, more students enroll in the class during the fall than the spring or summer. Students submit more quizzes and have better quiz grades during the spring than the summer or fall. Students perform better on the first three exams in the fall and better on the last exam during the summer. The homework assignment, the trading game, has better performance in the fall than the other two semesters. The overall course average is higher during the summer than other semesters. More students attend the lab in the summer, but more students attend the lecture section in the fall. The average quiz grade per quiz is higher in the fall, then the summer, and lastly, spring. Students take their exams in a timelier manner in the spring than other times. The average of the weighted quiz average and exam scores is higher in the spring, as well as the raw score for Exam 4 before the curve and overall attendance. Bonus points for online problems boosted summer grades more than other semester grades. Thus, the findings show students generally perform better in spring term, but students use more extra credit opportunities in the summer to pass, which suggests a slightly difference clientele of students take or retake finance in the regular year (spring or fall) versus the summer.

Table 6 breaks down grades in the summer according to those who took the course over the entire summer, those who took it in the first four weeks of the summer semester, and those who took the course during the final four weeks of the summer schedule. Results indicate most students opt for taking the class for the entire summer. These students submit more quizzes. Summer 2 students perform better on all exams. Students who take the course over the entire summer perform better on the semester-long homework assignment, have a higher course average, attend labs more often, are timelier in taking exams, and attend class more often. Thus, the natural mini experiment of time in summer demonstrates higher achievement when more time is used, but this is within the normal confines of scheduling. Thus, built-in time administratively enhances the potential for learning.

Table 7 analyzes the final standings for students among the various sections. Online students took all exams and quizzes online through the school’s learning management system. They mailed in their homework assignments three times or turned them in person to the school’s secretary. Hybrid students

Table 5. Semester Means

Variable	Fall	Summer	Spring	T-test F = Sp	T-test F = Su	T-test Sp = Su
Equiz Submit	7.092	8.970	9.725	-41.549***	-27.512***	-0.036
Quiz Avg	31.565	41.121	52.698	-21.133***	-30.390***	14.187***
Exam 1	58.837	50.171	50.888	27.942***	29.361***	14.509***
Exam 2	52.950	49.590	47.174	16.212***	9.165***	7.976***
Exam 3	45.022	42.053	38.619	17.260***	7.672***	2.969***
Exam 4	25.665	35.498	23.565	5.410***	-23.480***	-21.652***
Trading Game	61.918	55.166	60.620	2.569***	12.780***	15.651***
Course Avg	32.625	37.824	32.855	-0.860	-19.656***	-10.628***
Lab Bonus	0.413	1.196	0.404	0.618	-24.670***	-25.354***
Lecture Bonus	0.044	N/A	-0.008	5.895***	N/A	N/A
Year	2013.109	2011.932	2012.932	127.751***	76.968***	24.621***
Avg Equiz	85.645	83.425	64.279	33.319***	5.122***	-32.005***
Exam Timely	0.202	0.486	10.072	-0.754	-18.276***	0.714
Avg WQA & E	50.450	N/A	65.451	-16.375***	N/A	N/A
Exam 4 Raw	78.755	N/A	81.685	-1.889*	N/A	N/A
Attendance	1.102	1.858	2.762	-11.070***	-6.117***	5.292***
EBonusPts	0.424	1.103	0.985	-4.717***	-6.320***	-0.727

Table 6. Summer Means

Variable	Summer	Summer 1	Summer 2	T-test S = S1	T-test S = S2	T-test S1 = S2
Equiz Submit	12.647	4.634	5.191	68.990***	23.353***	-2.164**
Quiz Avg	56.418	23.341	34.833	60.964***	19.438***	-11.692***
Exam 1	59.820	35.995	62.998	45.687***	-3.069***	-23.131***
Exam 2	57.913	33.310	65.987	40.247***	-6.785***	-25.164***
Exam 3	47.241	26.019	70.367	31.578***	-14.663***	-28.754***
Exam 4	40.413	18.691	75.180	29.271***	-12.789***	-23.678
Trading Game	61.794	34.076	N/A	29.816***	N/A	N/A
Course Avg	57.050	18.070	13.974	89.857***	33.197***	3.977***
Lab Bonus	1.241	0.919	N/A	2.443**	N/A	N/A
Year	2011.497	2012.660	2010.791	-51.442***	15.796***	40.501***
Avg Equiz	83.641	82.252	83.966	1.562*	-0.139	-0.936
Exam Timely	0.548	0.338	N/A	9.213***	N/A	N/A
Class Att Bonus	1.381	0.902	N/A	10.460***	N/A	N/A

Table 7. T-Tests of Final Means among Sections

Variable	Online	Hybrid	Traditional	O vs. H	O vs. T	H vs. T
Equiz Submit	14.499	16.534	16.525	10.126***	10.030***	-0.049
Quiz Avg	65.877	78.928	75.566	13.599***	10.382***	-4.192***
Exam 1	60.471	70.916	69.389	13.046***	12.055***	-2.513**
Exam 2	56.500	70.560	69.873	15.457***	15.738***	-0.945
Exam 3	49.812	60.693	60.244	12.205***	12.300***	-0.611
Exam 4	47.818	59.948	58.756	12.504***	11.941***	-1.462*
Trading Game	51.089	75.472	71.469	22.899***	19.757***	-4.537***
Course Avg	55.738	69.911	67.989	16.813***	15.276***	-2.848***
Lab Bonus	0	0.693	0.689	24.295***	18.569***	-0.097
Lecture Bonus	-0.000	-0.000	0.036	-0.097	1.091	1.456*
ClassAt Bonus	0	N/A	2.095	N/A	21.992***	N/A
Year	2012.425	2012.636	2012.615	5.017***	4.043***	-0.503
Avg Equiz	84.755	85.626	85.782	0.634	0.647	0.099
Exam Timely	0.096	0.291	0.538	4.728***	10.757***	6.058***
Avg WQA & E	66.94	66.656	67.599	-0.105	0.200	0.293

met once a week on campus in a laboratory problem-solving session led by a graduate student, otherwise known as the lab's teaching assistant (TA). Traditional students attended a class led by the major professor twice a week and went to the lab once a week. Results indicate more students chose the online option, then the hybrid version, and lastly the traditional one. Students submitted more online quizzes in the hybrid and traditional settings, leading to higher averages for those sections, with the highest being the hybrid section. Exam performance was much better in the hybrid and traditional classes, on average. The hybrid class performed better statistically at the 5% and 10% levels, respectively, for exams one and four. Homework grades were best for students in the hybrid section. Students in the traditional section were timelier in taking their exams. These results indicate that

overall, the hybrid and traditional formats are better than the online format, but tradeoffs exist between traditional and hybrid formats.

Table 8 provides t-statistics for differentials in passing rates before, during, and after the experiment. We see the passing rate was much higher before the experiment occurred and passing the course fell quite substantially and did not help students successfully pass the course. Since the end of the experiment, the passing rate has increased but not back to what it was before the experiment began. Thus, the original good intentions and hypothesis of improved scores by giving students more time yielded in poorer results. Moving forward, policymakers and educators should carefully weigh the pros and cons of moving forward and implementing policies just because students demand them and/or they are viewed to reduce the WDE rate.

5. Conclusions

Ultimately, the data shows that students who utilized the option to extend were students highly motivated to achieve passing grades already. Most students decided not to utilize the new scheduling options. Although some may view this experiment as a failure due to administration ending the new method and the increased workload to change grades (i.e., the experiment ended because of the dean's decision, given information that the registrar was overwhelmed with grade changes), there are several valuable takeaways. First, students intrinsically motivated to perform (i.e., grit) and to earn a good grade are going to do so, regardless of time constraints. Second, the option did help some students pass who otherwise would not. Third, certain students are prone to procrastination, as demonstrated in the lower individual assignment scores required during the semester of enrollment. Given these results, professors should consider providing alternative ways for individuals with specific needs or situational assistance in completing business finance. This could include independent studies or offering incompletes, typically requiring completion within the year, with guidance from the faculty and support from additional staff and administration. Make-up tests or use of a computer lab (if available and used for online testing) is allowed afterward to ensure professor bandwidth and another students' time is not infringed upon. Ultimately, the success of the student to learn not just for the degree but also for personal enrichment is paramount to the grade, and the onus of all this responsibility must be put on the student.

Like a financial option, these users had the right, not the obligation, to use the time extension option. Future financial pedagogical research may look at other options to see how performance is affected, including attendance and class format. College students tend to thrive in environments where some human interaction occurs, as demonstrated by the superior performance in the hybrid and traditional courses. Surprisingly, there is not much difference between the hybrid and traditional learning outcomes. This suggests maybe once a week is enough, since the gain for meeting twice more does not demonstrate in the data. Future research could test this theory by considering this hybrid setup of the lab only and a traditional setting with the lab (as done here). Additionally, a traditional setting with no lab could attempt to tease out differences and find what the optimal human interaction point is and if the additional time is worth the effort or is not statistically significant, which could lead to policy changes in basic business courses besides finance (such as accounting). Additional research could capture data using the methodology and exam proposed by

Table 8. Final Passing Rates Before, During, and After the Experiment

Group	Observations	Mean	Difference	T-statistic
Before	1267	82.2%	28.4%	19.4***
During	8160	53.8%		
During	8160	53.8%	-13.9%	-17.4***
After	6809	67.7%		
Before	1267	82.2%	14.6%	10.4***
After	6809	67.7%		

a study to calculate a gap closure, measuring learning by taking the difference in pre-test and post-test results (Kim & Krueger, 2017) to see how robust results are in the presence of other controls and various treatments of interest.

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Appendix. Variable Definitions

Variable	Definition
Equiz Submit	Number of quizzes submitted on the online learning management system
Quiz Avg	The average of the quizzes submitted for grading
Exam 1	Exam 1 score after the curve
Exam 2	Exam 2 score after the curve
Exam 3	Exam 3 score after the curve
Exam 4	Exam 4 score after the curve
Trading Game	Homework assignment incorporating purchasing various securities in an Excel spreadsheet
Course Avg	The average score of all assignments
Lab Bonus	Attendance bonus for attending weekly labs
Lecture Bonus	Attendance bonus for attending bi-weekly lectures
ClassAt Bonus	Attendance bonus for attending during the summer
Year	Observation year
Avg Equiz	The average quiz score
Exam Timely	Bonus for taking the exam on the time scheduled on the syllabus
Avg WQA & E	Average of the weighted quiz average and the exams
Ap Course Sco	The approximate course score
Exam 4 Raw	The raw score for Exam 4 before the curve
Attendance	Attendance bonus for some of the observations
EBonusPts	Bonus points for answering problems on the learning management system



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